

**ABSTRACT OF THE DISCLOSURE**

A technique for optically converting wavelengths in a multi-wavelength system is disclosed. In one embodiment, wherein the multi-wavelength system has  $W$  wavelength channels, wherein  $W = 2^N$ , the technique is realized by selectively directing a received frequency channel corresponding to a respective wavelength channel based upon a predetermined frequency mapping. Then, the frequency of the selectively directed frequency channel is shifted at least once by an amount defined by  $\pm 2^i \Delta f$ , wherein  $\Delta f$  is the frequency spacing between adjacent frequency channels, and  $i = 0, 1, \dots, N-1$ .

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